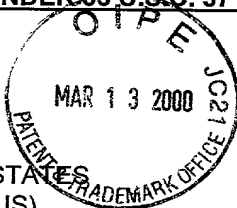


424/Rec'd PCT/PTO 13 MAR 2000
09/508422

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
REQUEST FOR FILING NATIONAL PHASE OF
PCT APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

To: Asst. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

(Our Deposit Account No. 03-3975)



TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)

Atty Dkt: PM 257741 /11439616/DV
M# /Client Ref.

From: Pillsbury Madison & Sutro LLP, IP Group:

Date: March 13, 2000

This is a **REQUEST** for **FILING** a PCT/USA National Phase Application based on:

- | 1. International Application | 2. International Filing Date | 3. Earliest Priority Date Claimed |
|----------------------------------|------------------------------------|--|
| PCT/CH98/00384
↑ country code | 8 September 1998
Day MONTH Year | 15 September 1997
Day MONTH Year
(use item 2 if no earlier priority) |

4. Measured from the earliest priority date in item 3, this PCT/USA National Phase Application Request is being filed within:

(a) ☐ 20 months from above item 3 date (b) ☒ 30 months from above item 3 date,

(c) Therefore, the due date (unextendable) is March 15, 2000

5. Title of Invention BILLING SYSTEM AND BILLING METHOD IN A TELECOMMUNICATIONS NETWORK

6. Inventor(s) RITTER, Rudolf et al

Applicant herewith submits the following under 35 U.S.C. 371 to effect filing:

- ☒ Please immediately start national examination procedures (35 U.S.C. 371 (f)).

- ☐ A copy of the International Application as filed (35 U.S.C. 371(c)(2)) is transmitted herewith (file in in English but, if in foreign language, file only if not transmitted to PTO by the International Bureau) including:

- a. ☐ Request;
b. ☐ Abstract;
c. _____ pgs. Spec. and Claims;
d. _____ sheet(s) Drawing which are ☐ informal ☐ formal of size ☐ A4 ☐ 11"

9. ☒ A copy of the International Application has been transmitted by the International Bureau.

10. A translation of the International Application into English (35 U.S.C. 371(c)(2))

- a. ☒ is transmitted herewith including: (1) ☒ Request; (2) ☒ Abstract;
(3) 16 pgs. Spec. and Claims;
(4) 3 sheet(s) Drawing which are:
☐ informal ☒ formal of size ☒ A4 ☐ 11"
b. ☐ is not required, as the application was filed in English.
c. ☐ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
d. ☒ Translation verification attached (not required now).

RE: USA National Filing of PCT/CH98/00384

514 Rec'd PCT/PTO 13 MAR 2000

11. ☒ **PLEASE AMEND** the specification before its first line by inserting as a separate paragraph:
- a. ☒ --This application is the national phase of international application PCT/CH98/00384 filed September 8, 1998 which designated the U.S.--
- b. ☐ --This application also claims the benefit of U.S. Provisional Application No. 60/____, filed ____.--
12. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., **before 18th month from first priority date above in item 3, are transmitted herewith (file only if in English) including:**
13. ☒ PCT Article 19 claim amendments (if any) have been transmitted by the International Bureau
14. ☐ Translation of the amendments to the claims **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., of claim amendments made before 18th month, is attached (required by 20th month from the date in item 3 if box 4(a) above is X'd, or 30th month if box 4(b) is X'd, or else amendments will be considered canceled).**
15. **A declaration of the inventor** (35 U.S.C. 371(c)(4))
- a. ☒ is submitted herewith ☒ Original ☐ Facsimile/Copy
- b. ☐ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
16. **An International Search Report (ISR):**
- a. Was prepared by ☒ European Patent Office ☐ Japanese Patent Office ☐ Other
- b. ☒ has been transmitted by the international Bureau to PTO.
- c. ☒ copy herewith (2 pg(s).) ☒ plus Annex of family members (1 pg(s).).
17. **International Preliminary Examination Report (IPER):**
- a. ☒ has been transmitted (if this letter is filed after 28 months from date in item 3) in English by the International Bureau with Annexes (if any) in original language.
- b. ☐ copy herewith in English.
- c.1 ☒ IPER Annex(es) in original language ("Annexes" are amendments made to claims/spec/drawings during Examination) including attached amended:
- c.2 ☒ Specification/claim pages #11, 15 & 16 claims #1 - 6 and 23 - 30
Dwg Sheets #
- d. ☒ Translation of Annex(es) to IPER **(required by 30th month due date, or else annexed amendments will be considered canceled).**
18. **Information Disclosure Statement** including:
- a. ☒ Attached Form PTO-1449 listing documents
- b. ☐ Attached copies of documents listed on Form PTO-1449
- c. ☒ A concise explanation of relevance of ISR references is given in the ISR.
19. ☒ **Assignment** document and Cover Sheet for recording are attached. Please mail the recorded assignment document back to the person whose signature, name and address appear at the end of this letter.
20. ☒ Copy of Power to IA agent.
21. ☐ **Drawings** (complete only if 8d or 10a(4) not completed): ____ sheet(s) per set: ☐ 1 set informal;
☐ Formal of size ☐ A4 ☐ 11"
22. ☐ ____ (No.) **Verified Statement(s)** establishing "small entity" status under Rules 9 & 27
23. **Priority** is hereby claimed under 35 U.S.C. 119/365 based on the priority claim and the certified copy, both filed in the International Application during the international stage based on the filing in (country) SWITZERLAND of:
- | | <u>Application No.</u> | <u>Filing Date</u> | | <u>Application No.</u> | <u>Filing Date</u> |
|-----|------------------------|-----------------------|-----|------------------------|--------------------|
| (1) | <u>2175/97</u> | <u>Sept. 15, 1997</u> | (2) | _____ | _____ |
| (3) | _____ | _____ | (4) | _____ | _____ |
| (5) | _____ | _____ | (6) | _____ | _____ |
- a. ☒ See Form PCT/IB/304 sent to US/DO with copy of priority documents. If copy has not been received, please proceed promptly to obtain same from the IB.
- b. ☐ Copy of Form PCT/IB/304 attached.

RECEIVED - 09/13/99

514 Rec'd PCT/PTO 13 MAR 2000

24. Attached:

25. Preliminary Amendment:

25.5 Per Item 17.c2, cancel original pages # _____, claims # _____, Drawing Sheets # _____26. **Calculation of the U.S. National Fee (35 U.S.C. 371 (c)(1)) and other fees is as follows:**Based on amended claim(s) per above item(s) ☐ 12, ☐ 14, ☐ 17, ☐ 25, ☐ 25.5 (hilitte)

Total Effective Claims	39	minus 20 =	19	x \$18/\$9	=	\$342	966/967
Independent Claims	5	minus 3 =	2	x \$78/\$39	=	\$156	964/965
If any proper (ignore improper) Multiple Dependent claim is present,				add \$260/\$130	+	+260	968/969

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4)): →→ **BASIC FEE REQUIRED, NOW** →→→→A. If country code letters in item 1 are not "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

See item 16 re:

1. Search Report was <u>not prepared by EPO or JPO</u> -----	add \$970/\$485	960/961
2. Search Report was prepared by EPO or JPO -----	add \$840/\$420 +840	970/971

SKIP B, C, D AND E UNLESS country code letters in item 1 are "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

→ ☐ B. If USPTO did not issue both International Search Report (ISR) and (if box 4(b) above is X'd) the International Examination Report (IPER), ----- add \$970/\$485 +0 960/961

(only) → ☐ C. If USPTO issued ISR but not IPER (or box 4(a) above is X'd), ----- add \$690/\$345 +0 958/959

(one) → ☐ D. If USPTO issued IPER but IPER Sec. V boxes not all 3 YES, ----- add \$670/\$335 +0 956/957

(these) → ☐ E. If international preliminary examination fee was paid to USPTO and Rules 492(a)(4) and 496(b) satisfied (IPER Sec. V all 3 boxes YES for all claims), ----- add \$96/\$48 +0 962/963

(4) →

(boxes)

27. **SUBTOTAL =** \$1598

28. If Assignment box 19 above is X'd, add Assignment Recording fee of ----\$40 +40 (581)

29. Attached is a check to cover the ----- **TOTAL FEES** \$1638

Our Deposit Account No. 03-3975

Our Order No. 60237 257741

C#

M#

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 and 492 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.

This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filedPillsbury Madison & Sutro LLP
Intellectual Property Group

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By Atty: Dale S. Lazar

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NOTE: File in duplicate with 2 postcard receipts (PAT-103) & attachments.

Billing System and Billing Method in a Telecommunications Network

The present invention relates to a billing system and a billing method for billing connections in a telecommunications network.

In the telecommunications field, a distinction is made between the communications provider, the service provider, and the user. The communications provider, in general a network operator, establishes the prerequisite for generating traffic by means of the infrastructure (fixed or mobile). The service provider can be the network operator himself, or or <sic.> a customer of this network operator, for example a service provider, for example a bank, which purchases airtime from an operator and sells it to the user as value added service. The user is a customer of a service provider. He uses a telecommunications system, and pays the service provider fees therefor, or he obtains a service (value added service) with a service provider.

In principle, the course of communication can be divided into two segments: signalling and traffic. The present invention relates to the determination of fees for both segments. Since, however, the signalling today is hardly charged for, only the determination of fees for the traffic segment will be described in the following. The traffic segment can be divided up into the following parts:

The carrier channels the traffic between the networks.

The operator runs the communications network, for instance a GSM, UMTS or IN network. He is the customer of the carrier.

The service provider is a customer of the operator, and obtains the communications service from him.

The service user is the end user, and is the customer of the service provider.

Determination of fees for traffic objects, for instance connections between carrier and operator, is carried out by means of the method known as interconnection. In principle, the same process, or a known variant via a classic billing system, can be used between the operator and the service provider.

- 5 Traditionally, a classic billing system, for instance a system based on so-called call detail records (CDR), is used between the service provider and the user. Each connection is billed itemized.

These conventional billing systems are very dependent upon the infrastructure systems. Complex system interconnections are thereby created.

- 10 Delivery of invoices today largely takes place on paper via the mail route. On the other hand, because there is a trend for the traffic fees to significantly drop, the cost ratio of revenue to billing expense is deteriorating. Moreover, such conventional billing systems generally do not enable user-dependent discounting. Moreover the systems cannot be combined well with pre-paid
15 services which are increasing in significance.

- More and more frequently, for instance in pre-paid systems, there is a demand for determining the connections and charging them to an account during or at the latest immediately after the connection. These requirements, however, call for the billing system to process in real-time all data determining
20 the price of a connection. For instance, during or shortly after the connection, the billing system has to collect and process all the timing information and geographic data about the connection to be billed for, for example the duration of the connection, the time of day, the location of the calling and the called party, possible discounts, etc. just after the connection <sic>. A heavy load is
25 thereby put on the billing system during peak hours and the billing system must be overdimensioned. Furthermore, depending on where the determination of the costs is executed, for instance in an operations center or in a SIM-card in a terminal device, it is sometimes difficult or even impossible to be provided with all the required information at the end of a connection. In mobile radio
30 systems, for example, the CDRs needed for billing a call are not available until about 15 minutes after end of the call.

Therefore, in order to avoid these disadvantages, it is the object of this invention to establish the technical provisions for a new billing system and for a new billing method.

This object is achieved through a billing system and a billing method
5 for the determination of usage fees incurred by a customer (operator, service provider or user) when using a digital telecommunications network which system and method comprise the features of the independent claims.

In particular, this object is achieved through a billing method in which the usage fees are determined from a dynamic client profile stored in a first
10 memory area. The client profile is derived from one or multiple random variables from previous connections of the customer. Subsequent to new connections of the customer, the stored client profile is again dynamically derived.

A prediction can thereby be made about the connection costs during
15 or even prior to the connection. These connection costs can, if necessary, be calculated immediately and charged to an account.

In a simple embodiment of the invention, the client profile is simply an average price per call derived from the customer's previous connections. However, the client profile preferably contains more statistical information
20 about the behavior of the customer, for instance information about the duration of the client's connections. For example, the client profile may contain the number of connections in pre-defined classes of duration, and/or the mean value and variance of the duration of the client's connections. The amount for the next connection can thereby also be determined from trends, for example.

The client profile can also contain multi-dimensional functions of
25 random variables from previous connections of the customer of the digital telecommunications network. For example, the client profile may contain information about the average duration of a customer's connections as a function of the time of day. If the billing system then recognizes that a specific
30 customer makes telephone calls which last longer in the evening than in the

morning, or longer on Sunday than during the working week, the costs of subsequent connections are determined accordingly as a function of the time of day and/or the day of the week.

The usage fees are also determined from a dynamic overall client
 5 profile stored in a second memory area. The overall client profile is derived from one or multiple random variables from previous connections of at least one group of users of the digital telecommunications network and it is dynamically adapted. The statistical load on the system, on which load the usage fees are dependent, can be determined from the overall user profile. The
 10 random variables used for the derivation of the overall client profile preferably contain the connection time, the time of day, the day of the week, and/or geographic characteristics of previous connections.

In this way, at the time of connection establishment, connection usage fees for new connections can be determined from the stored dynamic
 15 client profile and can be charged immediately to an account. These fees, however, are preferably communicated first to the user, the user having the possibility to interrupt the establishment of the connection if the price is too high for him.

In this way, the usage fees can be determined in a
 20 telecommunications terminal device, for instance in a fixed or mobile telephone. In this case, the terminal device contains a third memory area, which stores a pre-paid amount of money, as well as means for debiting or crediting this amount of money. This possibility is already available in GSM-mobile devices under the term advice of charge (AOC). The terminal device according to the
 25 invention further contains a processor to determine, and store in a first memory area, a dynamic client profile from one or multiple random variables of previous connections of the customer, and to determine from the stored dynamic client profile the amount for new connections and to debit this amount from the third memory area directly when a connection is established. The fees determined
 30 for new intended connections can be shown on the display of the device. Preferably, the usage fees also depend on a dynamic statistical overall client profile stored in a second memory area, the overall client profile being derived

from one or multiple random variables of previous connections by at least one group of users of the digital telecommunications network.

For example, the terminal device may contain a chipcard, for instance a SIM-card, comprising storage means and processing means for carrying out the billing method according to the invention. The method according to the invention may be carried out just as well in a billing system intended for the determination of telecommunications network usage fees or in any programmable device. The programmable device is preferably controlled by a computer program stored in a data carrier.

According to the invention, the usage fee for a connection or for signalling is not determined from this connection's random variables, such as duration, time of day, or distance, but from a client profile established from random variables of (all) previous connections of the customer. For instance, the costs of the next connection can be determined from the mean value of the duration of all previous connections of the customer. In this way, the costs of the connection can be determined during or even prior to establishing the connection, without having to wait for termination of the connection. For example, the costs can be charged to a pre-paid card or to a bank account. Thus, the signalling traffic can be simplified because signalling information does not need to be transmitted in real-time, but can be communicated later, so that changes to the user's client profile can be carried out afterwards.

The usage fee preferably further depends on a dynamic overall client profile determined by means of random variables from (all) previous connections of all users, or of at least one group of users. The determination of fees can also be adapted dynamically to the load on the system.

This method can be used not only between a service provider and the user, but also between a service provider and a user <sic.>, or between a carrier and an operator, or between an operator and a service provider. In this last case, the service provider is viewed as the customer of the operator, and the client profile is derived from one or more random variables of previous

connections of the service provider. The usage fees, which are billed to the service provider, are determined in this case periodically from this client profile.

Although only one embodiment example for the special case of determining fees in a GSM-network is described more closely in the following description, the method according to the invention can also be used for another
 5 mobile radio network, for example a UMTS or IN network, or for a fixed network, Internet, Intranet and Extranet, or for other telecommunications systems.

The present invention will be better understood with the aid of the description, given by way of example, and illustrated by means of the
 10 appended figures:

Figure 1 shows a perspective representation of a terminal device which can execute the method according to the invention;

Figure 2 shows the statistical distribution of the overall client traffic,
 15 which distribution can be stored in a second memory area;

Figure 3 shows the statistical distribution of the client traffic, which distribution can be stored in a first memory area;

Figure 4 shows the overall load on the system and the load by the client, both as a function of the time of day.

20 Figure 5 shows a flow chart of the billing method.

Figure 2 shows the statistical distribution of the overall client traffic, which distribution is derived from all connections of all customers. The curve shows the number of connections as a function of the duration of the connections. From this curve, the mean value t_{Gkp} and the variance S can be
 25 determined, for example a mean value t_{Gkp} of 80 seconds and a variance of 35 seconds. The timing characteristics of 95% of all connections is covered within $t_{Gkp}+2S$.

Depending on the application, other random variables of connections of customers can be used individually or in combination, for example the connection times, the times of the day, the day of the week, the holidays, the distances (national/national, national/international, international /international), and/or the location (of participant A and/or of participant B).
 The overall client profile, which can be stored, for instance, in a memory area, preferably contains one or multiple statistical parameters of the distribution of the overall client traffic, such as mean value, variance, class, moving average, distribution in pre-defined classes, etc. of the overall customer traffic
 distribution. The overall client profile is preferably determined dynamically on a periodic basis, for example daily or weekly, or after each connection.

From this overall client profile the revenue figures (mean time per connection and mean revenue per connection) can be defined. These revenue figures are decisive for the individual service user.

Each customer has his own client profile. The client profile of a new customer is based on the overall client profile. The amount to be billed for a new connection is predicted from the client profile during or even prior to this connection, and is possibly billed immediately. After each connection, the client profile is adapted in correspondence with a suitable algorithm, according to Figure 5. For instance, if a connection which was just closed is longer or shorter than the mean value t_{kp} , the statistical client profile is corrected accordingly. The fees for the next connections of the customer are thereby corrected.

The fees charged to the customer are virtually uninfluenced by the method according to the invention, at least after a sufficient number of connections and if the interest is not considered. Therefore, the method and system according to the invention are independent of the price policy of the carrier, network operator or service provider.

Figure 3 shows the client traffic distribution for a specific client, which distribution is derived from all connections between a service provider and the specific service users (or between an operator and a service provider

as the customer). In this case, the curve shows the number of connections of the customer as a function of the duration of the connections. From this curve, the client profile with the mean value t_{kp} and the variance S_{kp} can be derived. Preferably, the client profile, which can also be stored in a memory area,

5 contains one or multiple statistical parameters of the distribution of the client profile, such as mean value, variance, class, moving average, distribution in pre-defined classes, etc., of the customer traffic distribution. In the simplest embodiment, the client profile contains only the average price per connection for this customer. In a preferred embodiment, the client profile contains, in

10 addition, information about the duration of connections of this customer, for instance the mean value and the variance of this duration. Preferably, however, the client profile contains more information about this duration, for instance also the distribution in pre-defined classes, and about other random variables of connections, so that the costs for the subsequent connections can

15 be predicted reliably. This information is preferably registered multi-dimensionally so that, for example, the client profile contains information about the usual behavior of the customer as a function of the time of day and/or the day of the week, for instance in order to execute the dynamic determination of the fees differently in the morning than in the afternoon, according to the habits

20 of the customer.

The dynamic user profile can be stored in a first memory area 101, preferably in a SIM chipcard 10, if the billing method is carried out directly in a terminal device, for instance in a mobile telephone 1. The overall client profile can be stored in a second memory area 102, for instance. After each new

25 connection, the chipcard processor 100 determines the dynamic client profile depending on one or multiple random variables, and determines the usage fee for new connections from the stored dynamic client profile and possibly from the overall client profile.

If the card contains a third memory area storing a pre-paid amount of

30 money, the usage fee can be debited directly from this memory area prior to, or after, the connection. In a variant, the usage fee is charged to a bank account, or, if the card is provided with Trusted Third Party functions, the usage fee is signed electronically in the card and encrypted, and charged to a

corresponding account. This is possible, for example, if the card is a GSM-SIM-card which is provided with GSM 11.14 functions and with functions of the method described in the patent document EP689368. By means of these functions, it is possible to read time parameters from the card, which
 5 parameters serve as the basis for calculating the client profile.

Preferably, the client profile is corrected or adapted dynamically on a regular basis or after each connection. However, it is not necessary that this client profile is adapted in real-time. Thus, it is possible for the billing system to determine the statistical client profile when it is under less of a load, for
 10 instance outside the peak times, and need not be overdimensioned for the processing of connection information in real-time. For instance, this adaptation can be done on the basis of connection information known in the GSM-domain as call detail records (CDR), which are currently also being used for billing in the different layers. However, the connection information does not need to be
 15 transmitted to the billing system during the time of the connection.

Billing may take place in a billing system contained, for example, in an operating center, in the terminal device, or in a SIM-card in the telecommunications network.

It is also possible to statistically determine in a system the average
 20 system load B_{gkp} developing in the course of a day. Figure 4 shows the number of connections of all service users as a function of time (daily load of the system). For example, a day-time discount can be derived from this system load, which discount can control the system usage on the client side. For instance, the traffic fee to be paid can be modulated according to the system's
 25 capacity utilization. For instance, if it is determined from the client profile that, with a small variance of S , the customer typically telephones at the time x_{kp} , he may benefit from a daytime discount, if x_{kp} corresponds to a time with a small system load.

Analogous to this process, the traffic fee to be paid can be
 30 determined also for all other random variables mentioned above. Client profiles

of individual clients can be combined in group profiles of friends and families, companies, etc.

Statistical discounts (moving of statistical parameters on the time axis) can also be used.

5 For example, the invention can be used by a service provider who sells services outside telecommunications (e.g. a financial service provider) and who sells connections as value-added services. With the present invention, billing of subscriptions and traffic costs to service users becomes much simpler.

10 Thus, the present invention makes it possible to debit the costs of connections in advance (debit systems instead of conventional credit billing systems). Thereby, possibilities of fraud may be reduced significantly.

Text for flow chart in Figure 5:

15	20	storing of the overall client profile as client profile, $t_{kp} := t_{gkp}, S_{kp} := S_{gkp}$.
	21	establishing a connection
	22	determination of the usage fee from the client profile
	23	usage fee > available monetary amount?
	24	connection not established
20	25	connection established; end of connection
	26	determination of random variables: duration t , etc.
	27	derivation of a new client profile with characteristics of the last connection, $t_{kp} = f(t_{kp}, t), \dots$

Claims

1. Billing method to determine usage fees which arise through the use of a digital telecommunications network, characterized in that the usage fee billed to the customer for a connection is determined from statistical characteristics of previous connections of this customer.

2. Billing method according to claim 1, characterized in that the usage fee charged to a new customer of the telecommunications network for a connection is determined from statistical characteristics of previous connections of at least one group of users, for example of all users of the digital telecommunications network.

3. Billing method to determine usage fees which arise through the use of a digital telecommunications network, characterized in that the usage fees billed to a customer are determined from a dynamic client profile stored in a first memory area, which profile is derived from one or multiple random variables of previous connections of this customer, the stored client profile being dynamically derived again after new connections of the customer.

4. Billing method according to claim 3, characterized in that the usage fees are determined from a dynamic overall client profile stored in a second memory area, which profile is derived from one or multiple random variables of previous connections of at least one group of users of the digital telecommunications network.

5. Billing method according to claim 3, characterized in that the client profile contains a value proportional to the average price per connection of the customer.

6. Billing method according to claim 3, characterized in that the client profile contains a value proportional to the average duration of a connection of the customer.

7. Billing method according to claim 3, characterized in that the client profile contains the number of connections of the customer in pre-defined classes of duration.

8. Billing method according to claim 3, characterized in that the client
5 profile also contains multi-dimensional functions of random variables of previous connections of the customer of the digital telecommunications network.

9. Billing method according to claim 3, characterized in that the
10 random variables used to derive the client profile include the connection duration, the time of day, the day of the week, and/or geographic characteristics of previous connections.

10. Billing method according to claim 3, characterized in that the usage fees for new connections are dependent on the statistical system load obtained from the overall client profile.

11. Billing method according to claim 3, characterized in that the
15 usage fees for new connections are determined from the stored dynamic client profile when the connection is established and that said usage fees are charged directly.

12. Billing method according to claim 3, characterized in that the
20 fees which will be determined for anticipated new connections are determined prior to establishing the connection and communicated to the customer, the customer having the possibility to interrupt the connection establishment if the price is too high for him.

13. Telecommunications terminal device (1) comprising:

25 a third memory area (103), storing a pre-paid amount of money,

a processor (100) which can debit or subsequently load the amount of money,

characterized in that the processor in addition determines a dynamic client profile from one or more random variables of previous connections of the customer and can store it in a first memory area (101),

and that the processor can determine the amount for new
 5 connections from the stored dynamic client profile and can debit it directly out of a third memory area (103) when a connection is established.

14. Telecommunications terminal device according to the preceding claim, characterized in that it can in addition display the amounts for new intended connections, which amounts are determined from the stored client
 10 profile.

15. Telecommunications terminal device according to claim 14, characterized in that the fee for new connections is determined from a statistical dynamic overall client profile stored in a second memory area (102), which overall client profile is derived from one or multiple random variables of
 15 previous connections of at least one group of customers of the digital telecommunications network, the stored overall client profile being adapted dynamically.

16. Telecommunications terminal device according to claim 14, characterized in that the random variables used to derive the client profile
 20 include the connection duration, the time of day, the day of the week, and/or geographic characteristics of previous connections.

17. Telecommunication terminal device according to claim 14, characterized in that the fees for new connections are dependent on the statistical system load obtained from the overall client profile.

25 18. Chipcard (10) which can be used in a telecommunications device, comprising:

a first memory area (101) which stores a dynamic client profile which is derived from one or multiple random variables of previous connections of owner of the chipcard,

a processor (100) to determine the dynamic client profile again after
 5 a new connection, and to determine the usage fee for new connections from the stored dynamic client profile.

19. Chipcard according to the preceding claim, characterized by the following additional features:

a third memory area (103) storing a pre-paid amount of money,
 10 means (100) to debit or subsequently load the amount of money,
 means (100) to debit directly from the third memory area the fee for new connections determined from the stored dynamic client profile.

20. Chipcard according to claim 18, characterized in that the fee for new connections is determined from a statistical dynamic overall client profile
 15 stored in a second memory area (102), which overall client profile is derived from one or multiple random variables of previous connections of at least one group of customers of the digital telecommunications network, said overall client profile being adapted dynamically.

21. Chipcard according to claim 18, characterized in that the random
 20 variables used to derive the client profile include the connection duration, the time of day, the day of the week, and/or geographic characteristics of previous connections.

22. Chipcard according to claim 18, characterized in that the fees for new connections are dependent on the statistical system load obtained from
 25 the overall client profile.

23. Billing system, intended for the determination of telecommunica-

tions network usage fees, comprising:

5 a first memory area which stores a dynamic client profile for at least one customer of the telecommunications network, said client profile being derived from one or multiple random variables of previous connections of the customer,

means to determine one or multiple random variables with every new connection,

means to calculate again the dynamic client profile depending on the determined random variable(s),

10 means to determine the usage fee from the stored dynamic client profile and to charge said fee to the client.

24. Billing system according to claim 23, characterized in that the usage fee is determined from a statistical dynamic overall client profile stored in a second memory area, which overall client profile is derived from one or
15 multiple random variables of previous connections of at least one group of customers, the stored overall client profile being adapted dynamically.

25. Billing system according to claim 23, characterized in that the random variables used to derive the client profile include the connection duration, the time of day, the day of the week, and/or geographic
20 characteristics of previous connections.

26. Billing system according to claim 23, characterized in that the usage fee is dependent on the statistical system load obtained from the overall client profile.

27. Data carrier programmed by a computer program which can be
25 used to control a programmable device, comprising:

means to store in a first memory area a dynamic client profile for at least one customer of a telecommunications network, said client profile being derived from one or multiple random variables of previous connections of the customer of the digital telecommunications network,

5 means to determine one or multiple statistical characteristics with every new connection,

means to determine again the dynamic client profile depending on the determined random variable(s),

10 means to determine a usage fee from the stored dynamic client profile.

28. Data carrier according to the preceding claim, characterized in that the usage fee is determined from a statistical dynamic overall client profile stored in a second memory area, which overall client profile is derived from one or multiple random variables of previous connections of at least one group of
15 customers, the stored overall client profile being adapted dynamically.

29. Data carrier according to claim 27, characterized in that the random variables used to derive the client profile include the connection duration, the time of day, the day of the week, and/or geographic characteristics of previous connections.

20 30. Data carrier according to claim 27, characterized in that the fees for new connections are dependent on the statistical system load obtained from the overall client profile.

Abstract

Billing method and billing system to determine usage fees which are charged to the user of a digital telecommunications network, whereby a usage fee charged for a connection is determined prior to establishing this connection
5 from statistical characteristics of previous connections of the user.

Preferably, the usage fees are determined from a dynamic client profile stored in a first memory area, which profile is derived from one or multiple random variables of previous connections of the user of the digital telecommunications network. After new connections of the user, the stored
10 client profile is again dynamically derived.

In a simple variant, the client profile contains a value proportional to the average price per connection or to the average duration of a connection of the user.

In a preferred embodiment, the client profile also contains multi-
15 dimensional functions of random variables of previous connections of the user of the digital telecommunications network.

The random variables used to derive the client profile include, for example, the connection duration, the time of day, the day of the week, and/or geographic characteristics of previous connections.

20 Preferably, the usage fees are also dependent on a statistically derived system load.

Advantages: for example, in a pre-paid system, the usage fees can be charged already prior to establishing the connection.

(Figure 5)

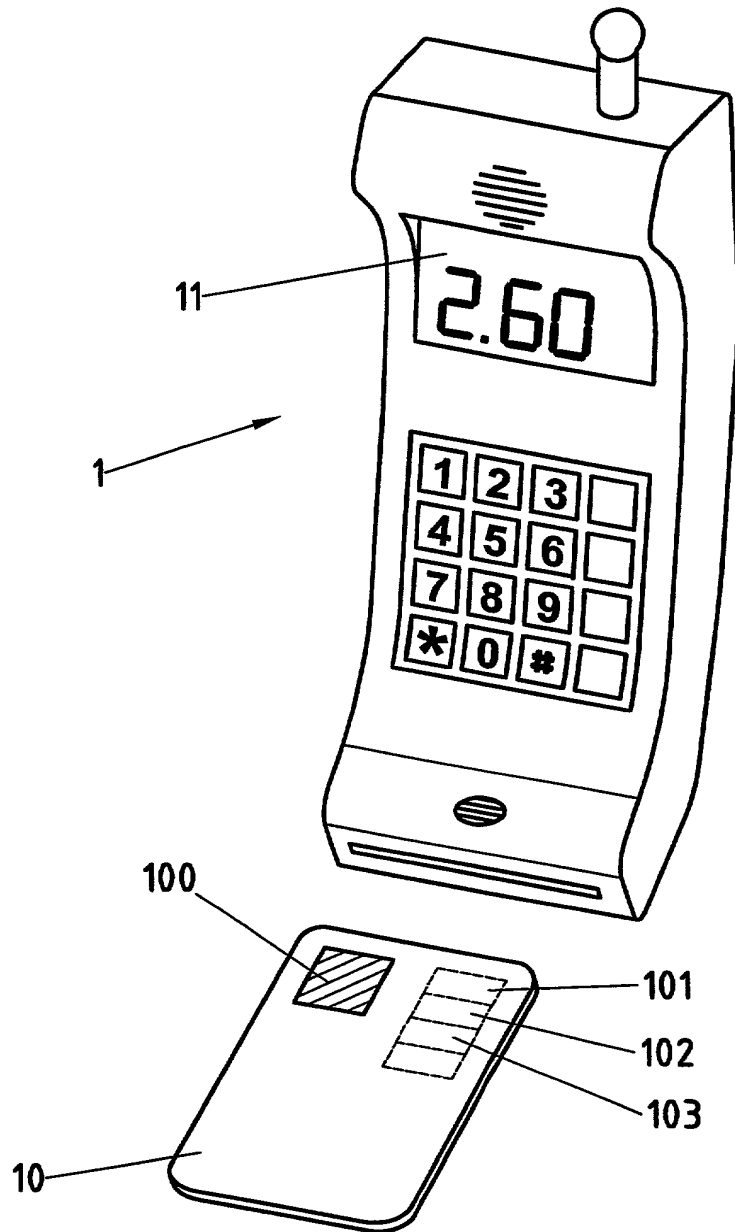


FIG. 1

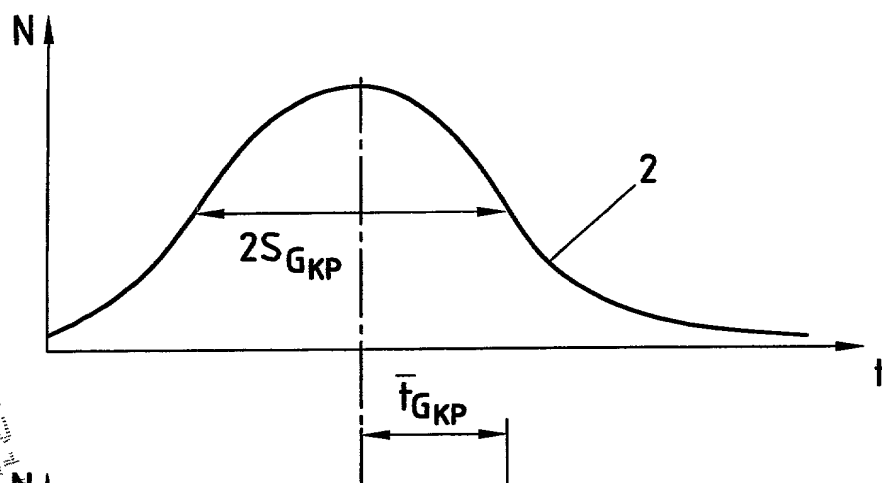


FIG. 2

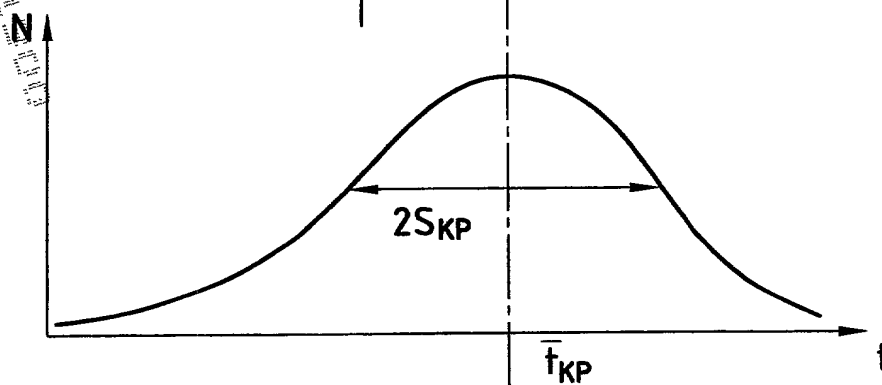


FIG. 3

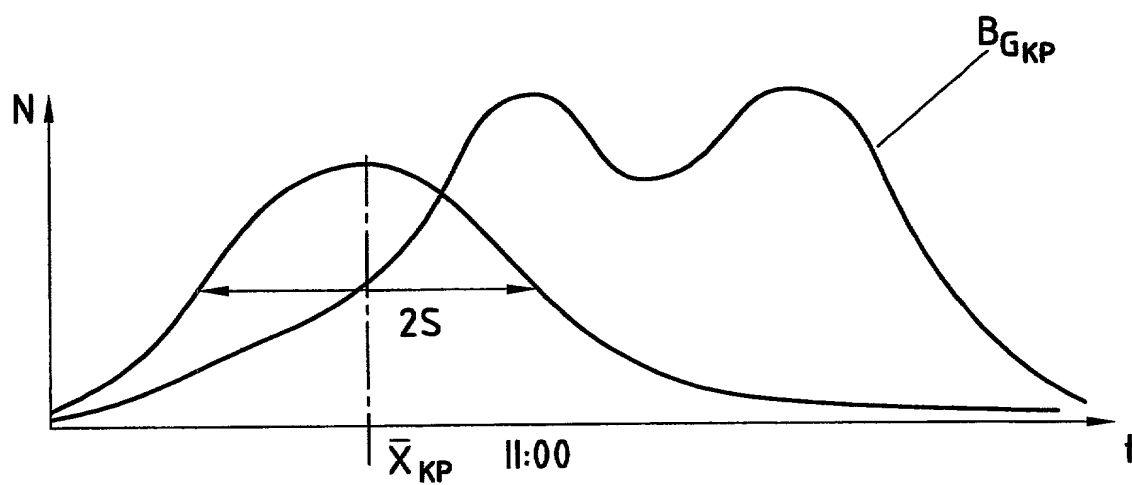


FIG. 4

3/3

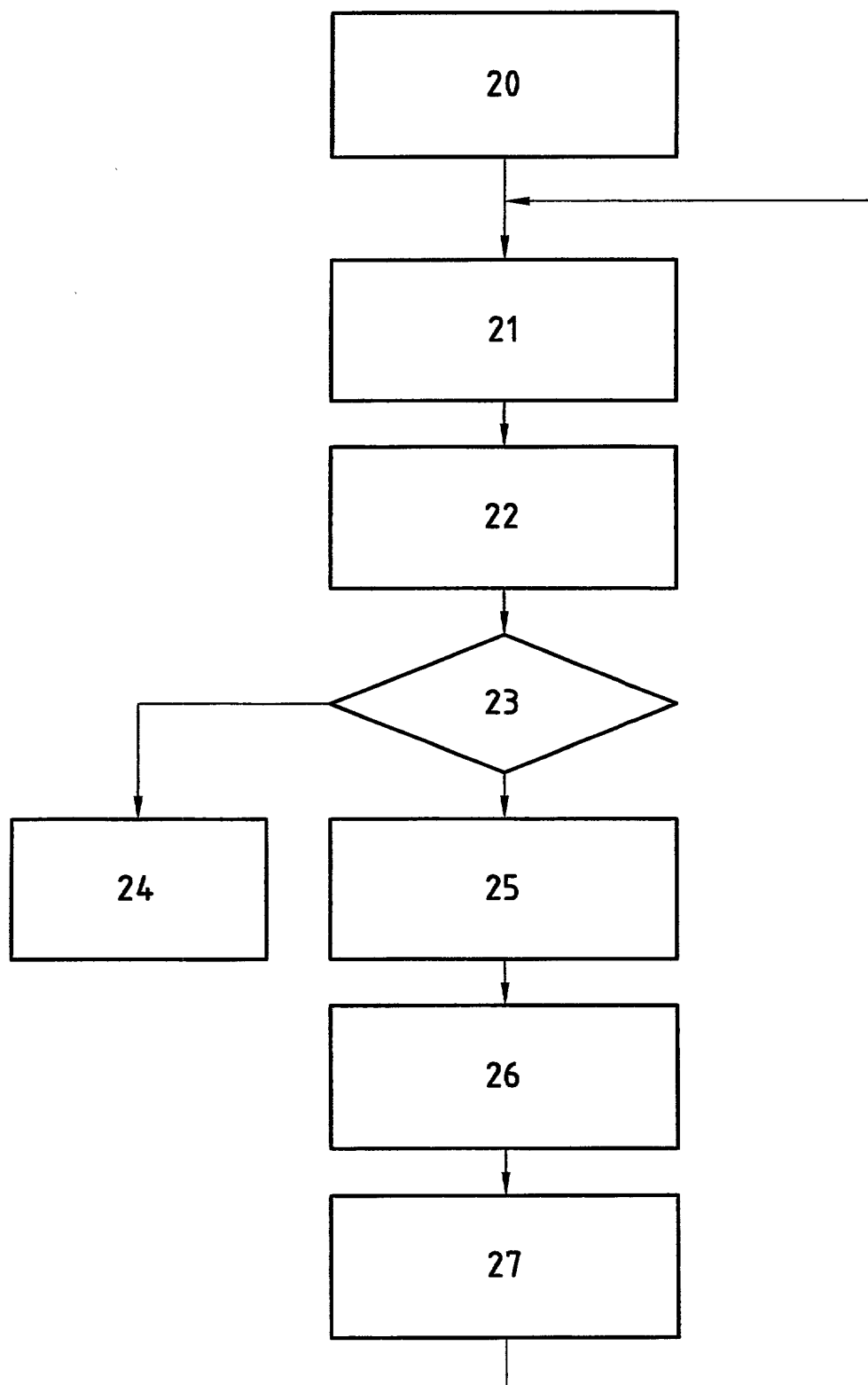


FIG. 5

FOR UTILITY/DESIGN
CIP/PCT NATIONAL/PLANT
ORIGINAL/SUBSTITUTE/SUPPLEMENTAL
DECLARATIONS

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the INVENTION ENTITLED

Billing System and Billing Method in a Telecommunications Network

the specification of which (CHECK applicable BOX(ES))

X -> ☒ is attached hereto.

BOX(ES) -> ☐ was filed on _____ as U.S. Application No. 0 / _____
-> ☒ was filed as PCT International Application No. PCT/ CH98/00384 on 8 September 1998

-> ☐ and (if U.S. or PCT application amended) was amended on _____

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. I hereby claim foreign priority benefits under 35 U.S.C. 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application:

PRIOR FOREIGN APPLICATION(S)	Date first Laid-	Date Patented	Priority Claimed		
Number	Country	open or Published	or Granted	Yes	No

2175/97	Switzerland	15.09.97		XX	
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I hereby claim domestic priority benefit under 35 U.S.C. 119/120/365 of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application:

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S)	Status	Priority Claimed		
Application No. (series code/serial no.)	Day/MONTH/Year Filed	pending, abandoned, patented	Yes	No

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Madison & Sutro LLP, Intellectual Property Group, 1100 New York Avenue, N.W., Ninth Floor, East Tower, Washington, D.C. 20005-3918, telephone number (202) 861-3000 (to whom all communications are to be directed), and the below-named persons (of the same address) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete names/numbers below of persons no longer with their firm and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above firm and/or a below attorney in writing to the contrary.

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